



What is a serving size?

Background

Food labels and other guides often use “serving size” to describe a recommended single portion of food. Serving sizes are different for various kinds of food (liquid versus solid foods and cooked versus raw foods). In many cases, the amount specified as a “serving size” for a particular food is smaller than the amount typically eaten.

Frequently, the serving sizes listed on “Nutrition Facts” labels of food packages are larger than the serving sizes listed by other guides to healthy eating, such as the FDA Food Plate. Serving sizes listed on food labels are designed to make it easier to compare the calorie, carbohydrate, and fat content of similar products and to identify nutrients present in a food. Used appropriately, the information on food labels can help consumers make better food choices.

This activity introduces students to solid and liquid measures and to the concept of “serving size.”

Instructional Objectives

The student will

- Estimate serving sizes of different foods and compare their estimates to “correct” serving size information provided on a “Nutrition Facts” food label.
- Calculate the percent of change between their estimated serving size and the recommended serving size from the “Nutrition Facts” food labels.

NASA Relevance

Nutrition is critical for all aspects of human health, on Earth and in orbit. Without adequate nutrition, problems can arise for every single system in the body, from bone to blood and from the heart to the brain. Ensuring astronauts have the right nutrients in the food they eat while in space is critical for their health on orbit and after they return to Earth. To ensure that astronauts will be able to perform their jobs during a mission, it is important that they receive adequate daily caloric and nutritional intake to maintain their energy levels and good health. Additionally, it is important to provide a large variety of foods to the International Space Station (ISS) crews that stay on orbit for long periods of time (4 – 6 months). Without sufficient variety, crew members may begin to decrease the quantity of food they consume due to over consumption of one type of food. Inadequate food consumption, of course, leads to inadequate nutrition. Good nutrition is critical to ensure that other health measures (such as exercise) are successful. Maintaining an astronaut's health and fitness for return to Earth's gravity is crucial.

Preparing For The Activity

Student Materials (four students per group)

- 3 paper plates (for dry foods)
 - 2 measuring cups
(one for dry food, one for liquids)
 - Scale for measuring mass (weight)
 - 1 Large paper cup for liquid measurement (optional)
 - 1 permanent marker
 - What is a Serving Size? - Student Handout
 - Labels & Estimates student handout
 - Quick Hand Measurements handout
 - Copies of "Nutrition Facts" labels for each food
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Teacher Materials

- 1 – 2 packages of each of the following foods: Large bag of loose M & Ms, dry breakfast cereal, and popped popcorn (Remove and save "Nutrition Facts" labels from packaging.)
- Gallon and Sandwich size baggies
- *Liquid measurements are optional*

Materials Per Group

- 3 paper plates for dry sample foods
- Copies of "Nutrition Facts" labels and Serving Size - Student Handout
- 1 Large paper cup for liquid measurement (optional)
- (Optional) 2-liter bottle of soft drink (Remove and save "Nutrition Facts" label from packaging.)

Setup for Activity

- *Allow 10 - 15 minutes for setup and 30 - 45 minutes to conduct activity*

Setup

Randomly pour different amounts of M & Ms, cereal, and popped corn into large gallon or sandwich size baggies. The students will use these baggies of food to make their predictions and measure their portion sizes.

Set up a "Teacher Display Station" where the foods are premeasured (counted and/or weighed) and displayed for the students to check their estimates. Label each food with a note card displaying the correct serving size for what is being displayed. The teacher can display greater or less amounts (1 ½ or 1/3 serving sizes) to challenge their students in determining the correct serving size. Do not show the students the "Nutrition Facts" labels until they are ready to check their work and calculate their percent of change.

Lesson Description

ENGAGE

Begin by asking your students, “What is a serving size?” Use the students’ answers to guide them into a discussion of food portions. Explain that food portions frequently are measured in terms of “cups”, grams or other units. Show students the premeasured containers (baggies) of the dry and liquid foods they will be using in this activity. Point out to the students that each of the units commonly used in cooking can be translated to standard international (metric) units, such as liters (L) or grams (g).

After students have discussed food portions and serving sizes, using pictures of food items, challenge them to predict serving sizes for liquid and solid foods below. See Figure 1 below.

PORTIONS VS SERVINGS*

FOOD ITEM	NORMAL PORTION	NUMBER OF SERVINGS
Bagel	1 whole	4
Muffin	1 large	3
Cinnamon bun	1 large	4
Flour tortilla	1 burrito-sized	2
Tortilla chips	1 individual bag	2
Popcorn	Movie theatre medium (16 cups)	8
Baked potato	One large	3
French fries	Medium order (4 oz)	4
Fried chicken	3 pieces (7–8 oz)	3
Steak	13 oz	5
Sliced ham or roast beef	Amount in typical deli sandwich (5 oz)	2

* Portions of many common foods consist of more than one “serving size.”

Figure 1

EXPLORE

Have "Materials Managers" pick up the materials for each group. Give each group a copy of the *What is a Serving Size?* - Student Handout. Have students follow the instructions in the handout to label the plates and cups. Then have the students predict what they "think" will be an appropriate portion size for each of the four foods.

Once students have completed their predictions, allow each group to measure and place the corresponding amounts of each food onto the plates and into the cup labeled "Estimate". Then have the students record their estimates on the handout.

After students have measured the amounts of food representing their predicted serving sizes, have the students compare the estimated serving size on their plates and cup – to what the teacher has displayed at the "Teacher Display Station"; where the foods are premeasured (counted and/or weighed) and labeled. Have the student's record the "Teacher Display Station" serving size for each food. Last, have the students determine if the estimates on their plates are the same, more, or less than the premeasured amounts at the display station and record their answers.

Distribute a copy of the "Nutrition Facts" labels for each food. Have students record the serving size recommendations for each item from the "Nutrition Facts" label. Next, have the students calculate the *Percent of Change* between their estimated amounts and the recommended amounts.

EXPLAIN

Journal: Write a short paragraph to answer each of the following questions:

- Compare your serving size estimates to the "Teacher Display Station" serving sizes. Describe any differences.
- Based on the information you collected, why do you think it might be important to look at the serving sizes listed on food labels?
- Estimation skills are an invaluable tool to scientists, engineers, and researchers. What are some other ways you can use estimation skills on a daily basis?
- Allow each group to share its findings with the rest of the class.

EXTEND

Distribute a copy of the Labels & Estimates (Refried Beans) student handout to each student. Help students find other relevant information on the label, such as total calories needed and amounts of important nutrients. Point out the “Quick Hand Measures” of portion sizes on the handout. Ask students, “Do you think food labels can help you make better decisions about what and how much to eat? Explain.”

EVALUATE

Have the class develop a scoring method to evaluate the estimation skills of their peers. One suggestion is for the class to develop the scoring tool based on the range of differences between the estimated serving size and the actual serving size of the four foods.



What is a Serving Size?

Student Handout

Have you ever wondered what are appropriate serving sizes of different foods? You will be investigating serving sizes of the foods displayed in your classroom.

You will need three paper plates and one large paper cup. Label the three paper plates and cup as "Estimate."

Serving Size: Estimates

1. Write the name of each food under the Food Name column in Table 1 below.
2. For each food, decide how many cups, fractions of a cup, grams, liters, mL, or number of pieces that will make up one serving size. Record your estimates on the table below.
3. Using your estimates, measure in a cup, weigh, or count the number of pieces for each food item and place on separate paper plates or cup labeled "Estimate". Then take these paper plates and cup to the "Teacher Display Station" where the foods are premeasured and displayed. Also bring this sheet with your serving size estimates. Compare the estimated amounts on your plates and in your cup, with the teacher's premeasured amount, and then record the "Teacher Display Station" serving size below. How does your estimated food portions compare with the teachers portions, are they the same, more, or less than you expected? Fill in last column with your answer.

Table I. Estimates

Food Names	One Serving "Estimates"	Teacher Display Station	Comparison
	Measured in cups, grams or liters	Serving Size – cups, grams, liters	More, Less, Same



Student Handout - Continued

Serving Size: “Nutrition Facts” Labels

- Next step, ask for a copy of the “Nutrition Facts” labels for each food. Write the name of each of food under the Food Name column in Table 2 below. Find the serving size recommendations for each food on the “Nutrition Facts” label. Write the recommended serving size listed on the label for each food in the appropriate space below.
- Compare your estimated amounts to the actual amounts and determine the Percent of Change. To calculate the Percent of Change, subtract the Estimated Amount from the Recommended Amount to yield the *amount of change*. Then take the Amount of Change and divide it by the Recommended Amount. Last, change the decimal to a percent by multiplying the result by 100. Record your answers.

Table II. Nutrition Fact Labels

Food Names	One Serving “Estimates”	“Nutrition Facts” Food Label Serving Size Recommended Amounts	Calculate Percent of Change	
			Recommended Amt – Estimate Amt = <i>Amt of Change</i> Amt of Change ÷ Recom Amt = Decimal Amt of Change Decimal Amt of Change × 100 = Percent of Change	
Example 1	28 grams	35 grams	35 – 28 = 7	500 – 525 = –25 (remove neg sign)
Example 2	525 mL	500 mL	7 ÷ 35 = 0.2	25 ÷ 500 = 0.05
			0.2 × 100 = 20%	0.05 × 100 = 5%



Student Handout - Continued

Journal: Write a short paragraph to answer each of the following questions:

1. Compare your serving size estimates to the serving sizes recommended by the "Nutrition Facts" labels. Describe any differences.
2. Based on the information you collected, why do you think it might be important to look at the serving sizes listed on food labels?
3. Estimation skills are an invaluable tool to scientists, engineers, and researchers. What are some other ways you can use estimation skills on a daily basis?

Labels & Estimates - Student Handout

Serving sizes often are smaller than the portions we actually eat.

Look for low levels of saturated, hydrogenated and trans fats. These are unhealthy.

Cholesterol is found in foods of animal origin.

Look for foods that have more carbohydrates as fiber and fewer as sugar. Only foods from plants provide fiber.

Protein is important for muscles and growth. It is found in animal and plant foods.

Vitamins and minerals are essential for health. Calcium is important for bones and teeth.

Use this section as a guide for daily planning. The amount of calories needed by each person depends on many factors, including exercise.

Refried Beans Fat Free

Nutrition Facts

Serving Size 1/2 cup (125g)

Serving Per Container 3.5

Amount Per Serving

Calories 130 Calories from Fat 0

% Daily Value*

Total Fat 0g **0%**

Saturated Fat 0g **0%**

Trans Fat 0g

Cholesterol 0mg **0%**

Sodium 490mg **20%**

Total Carbohydrate 24g **8%**

Dietary Fiber 7g **28%**

Sugars 0g

Protein 9g **16%**

Vitamin A **0%**

Vitamin C **0%**

Calcium **6%**

Iron **15%**

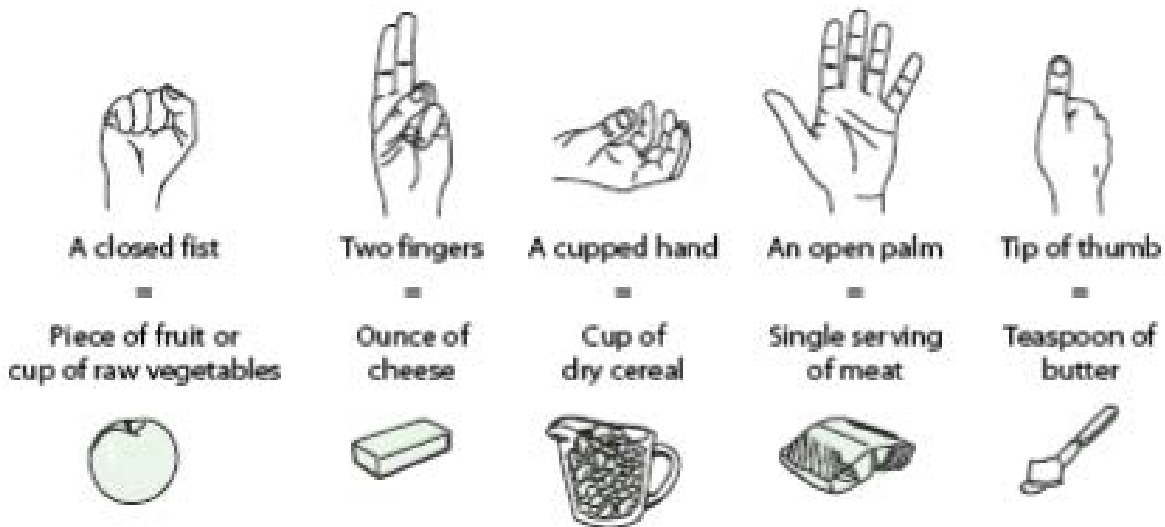
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories: 2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Quick Hand Measurements - Student Handout

Use the Quick Hand Measures to estimate the size of one serving of different foods.

Quick Hand Measures



National Standards

NCTM Mathematics Standards

Number and Operations

- Compute fluently and make reasonable estimates

NSTA Science Standards

Science as Inquiry

- Abilities necessary to do scientific inquiry

Science in Personal and Social Perspectives

- Personal Health

National Health Education Standards

Health Information, Products and Services

- Analyze the validity of health information, products, and services.
- Demonstrate the ability to use resources from home, school, and community that provide valid health information.
- Analyze how media influences the selection of health information and products.

Reducing Health Risks

- Demonstrate strategies to improve or maintain personal and family health.

Setting Goals For Good Health

- Demonstrate the ability to apply a decision making process to health issues and problems individually and collaboratively.
- Apply strategies and skills needed to attain personal health goals.